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ENGINEERING NEWS-RECORD

NEWS ISSUE—JUNE 3, 1948

Howard Bruce, civil engineer, becomes second-in-command of U.S. aid to Europe program

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News of the Week

ENGINEERING NEWS-RECORD • JUNE 3, 1948 • VOLUME 140 • NUMBER 23

Congress airs states' fight over Colorado River water

Measures before House and Senate propose court action to settle California-Arizona dispute—Little chance of action seen before close of current session

Bills under consideration by committees of both the Senate and the House bring up again the dispute between California and Arizona over division of Colorado River water. The two bills, both of them in the form of joint resolutions, authorize the United States to begin action in the Supreme Court for settlement of the controversy.

Court action opposed

Members of Congress from California and Nevada introduced the resolutions. The five other states in the Colorado River basin oppose the move. Failure of California and Arizona to agree on water rights is blocking urgently needed development of the river, particularly in the lower basin. Last year's Department of the Interior report on the river made clear that the department could not recommend authorization of any project until the water rights are settled.

Interior Secretary J. A. Krug last month sent the Senate Committee on Interior and Insular Affairs a letter setting forth, by request, the department's views on the current resolution. The letter cast serious doubts upon the wisdom of directing the Attorney General to start Supreme Court action as proposed.

Neither the Senate nor the House resolution stands any good chance of passage at this session. It is unlikely that either bill will reach the floor, observers believe.

Quarter-century battle

The controversy goes back more than 25 years. During that time, four measures have come into existence to govern rights to Colorado River water: the Colorado River Compact of 1922; the Boulder Canyon Project Act of 1928; the California Water Limitation Act of 1929, and the U. S.-Mexico Treaty of 1944. In accordance with these laws, the Secretary of the Interior has made contracts with the states and public agencies for use of Colorado River water.

None of the states wants any change in the existing laws—the dispute is purely over interpretation. Arizona and the Upper Basin states maintain that much time would be lost in submitting the laws to the Supreme Court. Mr. Krug's letter also expresses the fear that litigation might take years.

Upper states near agreement

Upper Basin states hope to have ready by July the draft of a compact among themselves to divide their allotted share of river water. They fear that litigation might delay ratification of a compact by their legislatures. Even without a compact, further development of their river resources would be possible, and they don't want a court case to block this prospect.

Half of flow unused

More than half the water in the Colorado at present flows unused through Mexico into the Gulf of California. The Mexican Water Treaty, approved by the Senate in 1945, guarantees 1,500,000 acre-ft. a year to Mexico, but an average of more than 9,000,000 acre-ft. a year now flows across the international boundary according to the best figures available.

Before settlers began to tap its resources, the Colorado discharged an average of 17,720,000 acre-ft. a year at the international boundary, according to U. S. Bureau of Reclamation estimates. The annual flow has varied from about 5,000,000 to 25,000,000 acre-ft., it is estimated, but Lake Mead helps to level out the variations with its 32,500,000 acre-ft. storage.

Present water uses in the United States cut the flow at the boundary by about 7,120,000 acre-ft. Consumption by the three Lower Basin states is well

(*Continued on page* 6)

Minneapolis Star photo

EASES RIVER TRAFFIC—A new $4,300,000 Mississippi River navigation lock at Hastings, Minn., (foreground) underwent initial tests recently when about 30 ft. of water was let into the structure. The lock is 600 ft. long, 110 ft. wide—just 100 ft. longer than the lock now in use—and will permit towboats to pass without breaking up their chain of barges. Regular use of the lock will be delayed pending dredging of the lower entrance.

NEWS IN BRIEF

In telegraphic form, here are latest news developments on the engineering and construction front during the week.

Highways — Obligations for state highway construction in *Nebraska* this year will total about $12,000,000, according to State Engineer F. H. Klietsch . . . The Pennsylvania Turnpike Commission has appointed Parsons, Brinckerhoff, Hogan & MacDonald of New York to plan a $4,000,000 bridge to carry the new eastern extension of the turnpike across the Susquehanna River from *Marsh Run* to *Highspire, Pa.* . . . The Ways and Means Committee of the Massachusetts Senate has reported adversely on a bill for construction of a high-speed parkway along the Charles River in *Boston* . . . N. Y. State Department of Public Works has proposed a $15,000,000 arterial highway through *Schenectady* . . . Hearings are being held this week on the application of the Elizabeth River Tunnel Commission for approval of plans for an $18,500,000 bridge-tunnel project to link *Norfolk* and *Portsmouth, Va.* . . . It is said that $6,500,000 will be needed to repair winter-damaged roads in *Virginia*.

Public Construction—T. W. Cunningham, Inc., of Bangor, Me., has made a low bid of $977,000 to build engineering and science buildings at the University of Maine, at *Orono* . . . The confluence of the South Saskatchewan River and Coteau Creek, 20 miles north of *Saskatoon* has been chosen as the site of a 210-ft. high irrigation dam. Work on the $66,000,000 project will not start for two years. . . . The Dade County Port Authority plans a $1,000,000 passenger terminal and international center at the *Miami, Fla.*, International Airport.

Industrial Construction—A $1,000,000 plant will be built near *Birmingham, Ala.*, by the Crosby-Hodges Milling Co. . . . Construction of a $5,000,000 oil refining unit at the *Lima, Ohio*, refinery of The Standard Oil Co. of Ohio has been authorized . . . *Missouri* Power and Light Co. has a $2,850,000 construction program, most of it to start this year . . . Allen & Kelley, architects and engineers, of *Indianapolis, Ind.*, have been retained to design and supervise construction of the new $35,000,000 Western Electric Co. plant there . . . Plans for the construction of a $2,500,000 resort hotel at *Los Angeles* were announced May 18 by Norman K. Winston and Associates of Los Angeles, Calif. The hotel will occupy a 45-acre site and will include a main building, 30 bungalows, four multiple unit structures, swimming pool and other recreational facilities. R. E. C. Ballinger, of Los Angeles, is consulting engineer . . . Pacific Pipeline Engineers Ltd., will lay the $5,000,000 pipeline for Standard Oil Company of California from *Rangely, Colo.*, to *Salt Lake City, Utah*.

Water Supply and Sewers—Granite rock was broken at *Richmond, Va.*, May 19 to inaugurate construction of the city's new $2,000,000 water purification plant. The work will include a new 12-bed filter and a new battery of aerators, and the construction of a new building . . . The *Oceanside, Calif.*, city council has issued a call for bids on a sewer treatment plant and outfall, after being authorized to float a bond issue for $200,000 at city elections.

Random Lines *from an editor's notebook . . .*

. . . *In which is outlined the career of a civil engineer-business executive who will help direct U. S. aid to 17 foreign countries*

President Truman last week appointed Howard Bruce of Maryland to be Deputy Administrator of the Economic Cooperation Administration. The appointment, confirmed by the Senate, puts a civil engineer-business executive in second command position on the ECA staff, directing U. S. aid to 16 European countries and China under the Foreign Assistance Act.

Acceptance of his ECA post as lieutenant to Administrator Paul G. Hoffman has caused Mr. Bruce to resign or request leave of absence from a number of executive positions in private industry. At the time of his appointment, he was chairman of the board of two firms, the Worthington Pump and Machinery Corp. and the Maryland Drydock Co., and director of five other enterprises.

Since his graduation with a B.S. in civil engineering from Virginia Military Institute in 1897, Mr. Bruce's life has been spent continuously in activities directly concerned with various phases of engineering—planning, construction, management and administration. It is expected that he will be a major factor in determining ECA policies with regard to direction and supervision of foreign assistance functions which involve engineering. Because the ECA staff is small, this part of the program may well call for advisory committees drawn from American industry and professional societies.

After acquiring his civil engineering degree, Mr. Bruce worked for the Chesapeake and Ohio Railway Co. for a brief period before taking a job as engineer with the East River Gas Co., New York. In ten years he advanced to assistant engineer and engineer of construction, Consolidated Gas Co., New York. In 1907, he became general manager of the Bartlett-Hayward Co., Baltimore, Md., and by 1928 had moved up to chairman of the board, a position he held until the firm consolidated with the Koppers Co.

Mr. Bruce has served as a member of the State Roads Commission of Maryland and at present is chairman of the state highway advisory council. During World War II he served in various capacities in the Army Service Forces from May, 1942, to September, 1945. In the last two years he was first deputy director and later director of materiel.—V.B.S.

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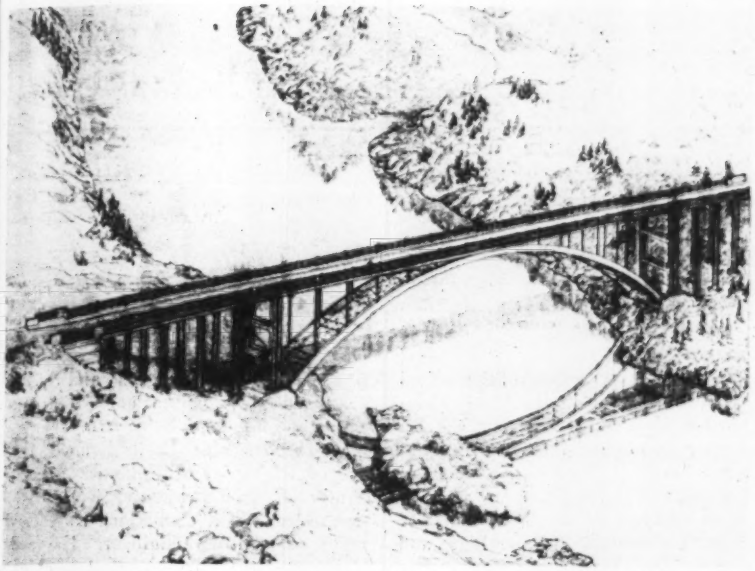


LIGHTWEIGHT BRIDGE—The first highway arch bridge in the world to be constructed of aluminum is now under way at Arvida, Que.

Begin first all-aluminum arch bridge

The city of Arvida, Quebec, recently awarded a contract for what will be the first all-aluminum arch bridge in the world, a 504-ft. structure across the Saguenay River.

Approved by city officials late in February of this year, a contract was awarded to the Dominion Bridge Co. of Montreal, and work has already started.

Providing a highway connection between Arvida and Shipshaw, the bridge is expected to weigh only 400,000 lb., while a similar steel structure would weigh in the neighborhood of 800,000 lb. The main span will be of fixed type aluminum arch construction, with a span of 290 ft. center to center, and a rise of 47 ft. 6 in. on the center line of the arch rib. There will be five approach spans to the north and five additional approach spans at the south end, the structure carrying a roadway 24 ft. wide between curbs with a 4 ft. sidewalk on either side.

Designed to conform to specifications of the Canadian Standards Association, the specified live load is U 100, or two 20 ton trucks abreast. The bridge will be built of Alcan 26-ST alloy aluminum. The main arch section will be composed of two aluminum web plates, 54 in. deep by $\frac{9}{16}$ in., with four angles 6 in. x 4 in. x ½ in. and two cover plates 32 in. x ¾ in., to form a closed box section.

The deck and side walk of the bridge are to be formed from precast concrete slab sections with reinforcing steel welded in the field and the slabs grouted together to form a continuous slab over the bridge between expansion joints. The roadway surface will be an asphalt wearing course over concrete slabs.

Bridge hand railings and approach pylons at the south entrance will also be of aluminum according to present plans.

Senate passes measure for flood control work

The Senate has acted upon the Army Civil Functions Appropriation Bill (H. R. 5524) and passed the measure providing $708,586,000 for flood control and navigation improvements, after rejecting a motion to cut the amount by $200,000,000 as an economy move. The measure supplies funds for Army civil functions during the fiscal year 1949, which begins July 1.

The Senate followed the recommendations of its Appropriations Committee and restored $102,000,000 in the bill (*ENR* May 6, vol. p. 671), thereby making no changes in the funds supplied for the Corps of Engineers. The increase includes $58,000,000 for flood control and $43,000,000 for rivers and harbors. This brings the total to $371,656,800 for flood control, plus an additional $67,500,000 for flood control work on the Mississippi River and tributaries, and $195,084,400 for rivers and harbors construction.

Insert salary rider in Interior bill

House floor action aimed at Straus and assistant overrides committee refusal to restrict salary payments

Despite a committee's refusal a week before to include salary restrictions aimed at the head of the Bureau of Reclamation, the House May 27 passed an appropriation bill for the Department of Interior that would in effect cut off the commissioner's salary.

The rider—attached to a $375,667,000 departmental appropriation—was proposed on the House floor by Rep. Alfred J. Elliott, of California, one of a Congressional group that has long sought to oust Reclamation Commissioner Michael Straus and Richard Boke, California regional director.

Previously (*ENR* May 27, vol. p. 763), a House appropriations committee had refused to consider writing any restrictions on qualifications into the bill.

Mr. Elliott's rider provides specifically that "no part of the salary . . . of any person named for the position . . . of Commissioner of Reclamation, assistant commissioner or regional director" shall be paid to anyone who is not "a qualified engineer with at least 10 years of engineering and administrative experience."

Informed sources in Washington said that the measure as passed by the House has little prospect of getting through the Senate.

Cuts President's request

As approved by the House, the appropriations measure represents an 18 percent cut in President Truman's budget request.

The largest share of the money will be earmarked for the Bureau of Reclamation, which is to be assigned $226,794,000 of the total for its water and power projects.

Among the projects for which funds are provided are Anderson Ranch Dam in Idaho, the Provo River Project in Utah; $45,312,000 of work on the Columbia Basin Project; $40,000,000 of work on the Central Valley Project in California; $19,000,000 for the Colorado-Big Thompson Project, and $52,767,000 for continuation of all phases of work on the Missouri River Basin plan.

The bill also makes available funds for the Bonneville Power Administration, the Bureau of Indian Affairs; work in the Territory of Alaska; the Geological Survey, and other agencies.

Although the Bureau of Mines is listed to receive more than $19,000,000, only $550,000 is con-truction money.

DEVELOPMENTS BEYOND U. S. BORDERS

Digested from reports by Engineering News-Record correspondents and the McGraw-Hill World News Bureau

Plan new hydro work in North Scotland, Spain, Australia—Announce U. S. delegation to international conferences—Russia builds prefabricated house factory—Other foreign news

Scotland—The North of Scotland Hydro-Electric Board has announced two new programs to utilize the water power resources of Glen Garry and Glen Moriston in Inverness for the production of electricity.

The programs cover an area of 309 sq. mi. northwest of the Great Glen, and will provide power for future industrial development in the Inverness-Fort William areas, and increase available electricity for other parts of Scotland.

Four previous attempts have been made (between 1928 and 1938) to develop the waters of Glen Garry and Glen Moriston, but these promotions did not receive the approval of Parliament.

The Garry project is estimated to cost about $21,000,000 and will utilize a catchment area of 151 sq. mi. to provide water for its turbines. Two main dams and two power stations and a subsidiary development centered on Loch Lundie are planned. The first of these dams—Loch Quoich Dam—will be 806 ft. long and 107 ft. high and the second will be 1,026 ft. long and 84 ft. wide.

The Moriston project will utilize the resources of 158 sq. mi. of catchment, through the construction of four dams and four generating stations with a total installed capacity of 56,000 kw. At present prices the cost of this job is estimated at about $40,000,000.

Spain—The Spanish government has recently completed and put into operation two dams on the River Ebro to shorten the course of the river and create the necessary head for four groups of turbo generators rated at 57,200 hp.

Located near the villages of Flix and Ribesalbes, the dams discharge their waters through two tunnels that connect with power houses.

Australia — Keepit Dam, on the Namoi River in New South Wales, will be the first Australian Dam to incorporate a movable-crest spillway. The structure is designed to cushion flood peaks. Drum gates floating in a chamber on the crest will be installed as part of the structure.

Built by the Water Conservation and Irrigation Commission of New South Wales, the dam will be a concrete gravity structure measuring 1,420 ft. along the crest and 135 ft. above the the bed of the river.

India—The government of the United Provinces is preparing to begin work on construction of Pipri Dam, on the Rihand River, in the southeast corner of the province about 80 miles southeast of Mirzapur.

The structure is to be a concrete gravity dam about 300 ft. high and 2,500 ft. long, with a spillway section 585 ft. long. The structure is planned to supply water storage for a power house with an installed capacity of 230,000 kw.

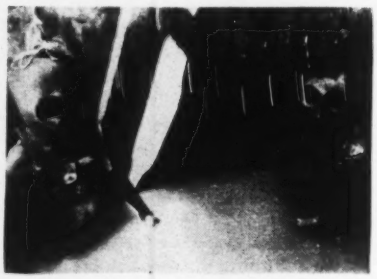
International Meetings . . .

An announcement from Washington, D. C., last week listed the official representation on United States delegations to the International Congress on Large Dams at Stockholm, June 10-17, and to the International Conference on Soil Mechanics and Foundation Engineering, which is to be held in Rotterdam, June 21-30.

The U. S. delegation to the large dams meeting will be headed by Gail A. Hathaway, special assistant to the Chief of Engineers, U. S. Army (*ENR* Feb. 26, vol. p. 314). Other members of the delegation to the conference will include:

Joel D. Justin, consulting engineer, Ithaca, N. Y.; Walker R. Young, chief engineer, Bureau of Reclamation; E. Robert De Luccia, chief, Bureau of Power, Federal Power Commission; B. F. Jakobsen, chief, Plans and Specifications Section, South Pacific Division, Corps of Engineers, U. S. Army; T. A. Middlebrooks, chief, Soils Branch, Office of the Chief of Engineers, U. S. Army; Clarence Rawhauser, Dams Division, Bureau of Reclamation; Karl Terzaghi, consulting engineer, Harvard University; and Carl P. Vetter, chief, Office of River Control of the Colorado River, Bureau of Reclamation.

The delegation to the Soil Mechanics and Foundation Engineering Conference includes, in addition to Messrs. Middlebrooks, Terzaghi, Hathaway, Jakobsen, Rawhauser, Young and Vetter, the following: T. B. Chambers, Soil Conservation Service, Department of Agriculture; James B. Thompson, assistant to the head of Soil Mechanics and Paving Section, Bureau of Yards and Docks.



WEIRD—Native divers employed in construction of dug wells in the Amazon Valley region of Brazil appear grotesque in the special helmets designed for their work. Able to work in depths of 30 ft. for an extended time, the divers are used to excavate around the bottom of the 10-ft. concrete caisson, which is thus sunk into place to form the well. These wells—designed by engineers of the Institute of Inter-American Affairs, provide simple, efficient facilities for village water supplies (*ENR* June 13, 1946, vol. p. 908).

Transport . . .

South Africa—The South African Railways and Harbors Administration has ordered 40,000 tons of 96-lb. rail from the Bethlehem Steel Corp., in the United States, subject to the granting of an export license. Railroad officials said that orders in the United States and the United Kingdom have been sufficiently large to meet all requirements, but efforts to build up stocks to insure an even flow to all departments have been only moderately successful because of restrictions in the exporting countries.

India—The Central Board of Transport has earmarked $300,000 for research into proposals for improving the access to the port of Calcutta from the Bay of Bengal.

Three models of the river mouth are being constructed to see what can be done to improve the route up the Hoogly River by dredging and diking, or, alternatively, what would be the best route for a special ship canal.

South Africa—Aircraft have been arriving at Palmiefontein, the only airport of entry for the Union of South Africa,

near Johannesburg, in such numbers that existing facilities are strained and the government has decided to spend another $700,000 on essential improvements. Alterations will include better hangar and workshop accommodations, and enlargement of terminal buildings.

Italy—The Italian Ministry for Public Works has announced arrangements for a committee of highway construction experts to travel to the United States to obtain cooperation of American road builders in reconstruction of the Italian highway system. Several large bridges on the Po River are still in a devastated condition, and road traffic between north and south is still difficult.

Mexico—Mexico's efforts, backed by an expenditure of more than $5,000,000, will complete the southern part of the Mexican sections of the Pan American highway by September, according to Augustin Garcia L., Secretary of Communications and Public Works.

U S Plywood Co. photo

TOWER FOR TEACHING—A 10-story central tower dominates Mexico City's new National Teachers Schools—an establishment capable of accommodating 19,000 pupils in two shifts. The tower houses essential services and general offices for the establishment, while two large wings contain auditoriums, workshops and classrooms. Mario Pani, of Mexico City, was architect.

Housing . . .

Russia—On the edge of the Karelian forests near Petrozavodsk, a large prefabricated house factory is going up—one of eighteen such enterprises being built in the Russian forest belt to supply housing for industrial workers.

Designed on completion to produce 4,000 one, two and three-room houses, or 200,000 square meters of housing per year, the Petrozavodsk enterprise expects soon to put out its first prefabs for steel workers at "Azovstal," a large metallurgical plant being restored in southern Russia on the Azov Sea.

To house the plant's workers about 400 duplex apartments are being built on the shores of Lake Onega.

Construction of a second prefabricated house factory of equal capacity is reported completed on the Kama River, near Molotov in the Urals.

Puerto Rico—The Puerto Rico Aqueduct and Sewer Service is negotiating in New York City for a loan of $23,000,000 to finance the construction program of that government agency. This includes the construction of new water supply systems and sewers throughout the island. The negotiations are being conducted by Sergio Cuevas, administrator and chief engineer of the service, J. Hately, economist, who recently made recommendations to improve the administration of the service, and D. R. Boniwell, director of the Puerto Rico Development Bank.

Investigations and studies that have been carried on in the towns of Puerto Rico have made it evident that almost all the aqueducts are inadequate for the supply of necessary water, and that the sewer systems are either too small or incomplete. There are 14 towns that have complete filtration and purification plants; four have plants for partial purification; and fourteen are provided for by deep wells. The 44 remaining towns are supplied with surface waters sterilized with chlorine. Only 42 towns on the island have sewer systems.

Personalities . . .

Germany—Karl Imhoff, consulting engineer of Essen, has announced that he is now cooperating with Llewellyn B. Griffith & Associates, consulting engineers of Austin, Tex., in research and development in connection with contact aeration methods of sewage treatment.

Dr. Imhoff, inventor of the Imhoff tank, has made many contributions to the field of sewage treatment and is well known in the United States. He is the author, with Gordon M. Fair, of Harvard University, of the book "Sewage Treatment".

Dr. Imhoff is presently engaged in perfection of biological gas production methods, expected to form part of an extensive conservation program in Germany.

Miscellany . . .

India—The largest construction project currently under way in India is a 350,000-long-ton-a-year ammonium sulphate plant near the Bihar Province town of Sindri. Chemical Construction Corp., of New York City, did the designing and is responsible for the engineering supervision while the Power-Gas Corp. Ltd., of Great Britain, has charge of procurement of all contracts and is supplying a large amount of its own process equipment. Scheduled for completion in 1950, the plant will cost about $50,000,000.

Japan—The Associated General Contractors of America has been utilized as a pattern for reorganizing the Japanese contractors association along democratic lines, according to a communication to the U. S. group.

The Japanse organization, now called the Associated General Contractors of Japan, was established with the assistance of the U. S. Army.

Argentina—An Italian construction firm, Borsari Co., of Bologna, has been given official permission to open local construction offices in Argentina and permission to import, duty free, a long list of construction equipment. In addition, the concern has been loaned $125,000 by the Central Bank to facilitate its operations. In an official decree, the Argentine government said that the firm will engage in highway and railroad construction and will be given preference by the government departments concerned.

Philippine Republic—The Philippine Ready-Mix Concrete Co., Inc., a new $2,500,000 Manila Corporation, has acquired the business interests of the Clarke-Halawa Rock Co., Honolulu, for more than $1,000,000. Chester R. Clarke, president of the Honolulu company, has in turn purchased 40 percent of the Philippine company stock and become its executive vice-president and general manager.

Congress airs Colorado River dispute

(*Continued from page one*)

within the allowable limits already established and accepted. California now takes less than 3,000,000 acre-ft.; Arizona less than 1,500,000 (or 2,500,000, according to California's claim); and Nevada less than 50,000.

Projects in existence or authorized could increase consumption in California to more than 5,600,000 acre-ft., and in Arizona to nearly 2,000,000 acre-ft. In addition, Arizona has other projects in the offing (such as the Central Arizona scheme described elsewhere in these pages) that would swell the state's annual demand to nearly 4,000,000 acre-ft.

Not enough for both

Not enough water is allowed the Lower Basin under the Colorado River Compact to satisfy the future plans of both California and Arizona. Both states know that their future growth depends on the amount of water they will get, and as a result are willing to do battle over the contested water, even at the cost of postponing river developments now urgently needed. California will soon need more Colorado River power; central Arizona's farmlands are shrinking because of water shortage.

As Secretary Krug pointed out in his letter, the outcome of the controversy could set California's annual allotment at anything from 4,000,000 to 6,250,000 acre-ft. For Arizona, the result might range from 2,250,000 to 3,500,000 acre-ft. These figures can be explained by consideration of the issues in dispute.

Compact provisions

The compact of 1922 (ratified within seven years by six of the basin states and in 1944 by Arizona) said in Article III (a): "There is hereby apportioned from the Colorado River system in perpetuity to the Upper Basin and to the Lower Basin, respectively, the exclusive beneficial consumption use of 7,500,000 acre-ft. of water per annum." Under III (b) the Lower Basin was given the right to increase its use of such waters by 1,000,000 acre-ft. a year.

In 1928, Congress passed the Boulder Canyon act, authorizing construction of Hoover Dam, contingent upon either (1) ratification of the Colorado River Compact by all seven basin states or (2) ratification by six states, including California, and enactment by California of a prescribed limitation law. California needed the project and wanted to get it started, and when Arizona refused to sign the compact, California passed the stipulated law limiting her annual use of Colorado River water to 4,400,000 acre-ft. under III (a), plus not more than half of any excess or surplus water unapportioned by the compact.

Points in dispute

Three basic points are in dispute:

(1) Is California entitled to share equally with Arizona in the 1,000,000 acre-ft. of water mentioned in Article III (b) of the Colorado River Compact? This issue means 500,000 acre-ft. to each state.

(2) Is a state entitled to salvage water (which nature formerly wasted in a desert channel) and not be charged under the compact with water so salvaged? Arizona is thus salvaging 1,100,000 acre-ft., otherwise wasted, from the Gila—a tributary of the Colorado. If this water were charged against her guaranteed allotment, the amount of surplus water remaining in the main stream automatically would be increased by the same figure. California might then get half, and Arizona half, of the increased surplus.

(3) Are evaporation losses at such reservoirs as Lake Mead to be borne by California and Arizona in proportion to the waters stored there for each of them? California maintains that her guaranteed allotment of 4,400,000 acre-ft. is a net figure, not subject to reduction for losses at reservoirs outside her borders. Her share of the losses could at times amount to 500,000 acre-ft. or more.

A fourth possibility, not at present in contention, was suggested by Mr. Krug's letter. Is the water that is required for delivery to Mexico to be deducted from surplus water before California gets her half, or would she first get her half and then contribute only enough to make up any deficit in the Mexican requirement? California disavows any intention of pressing for this advantage. In wet years, with large flow in the river, it could mean a difference of 750,000 acre-ft.

Contracts already made by the Secretary of the Interior call for eventual delivery of all the Lower Basin's III (a) and III (b) water in the compact. Five California contracts, signed between 1930 to 1934, total 5,362,000 acre-ft.; the state of Nevada made two in 1942-43 for 300,000 acre-ft.; Arizona in 1944, when she signed the compact, contracted for 2,800,000 acre-ft., and one-half of any excess or surplus waters unapportioned by the compact.

Future at stake

Future business development in California and Arizona will be acutely affected by the water dispute. Central Arizona already is feeling the effects of water shortage. The supply is insufficient for the lands now irrigated, groundwater supplies are being exhausted; about 1,200,000 acre-ft. is pumped annually for irrigation and domestic use.

The Colorado River is the only available source of additional water to save land under cultivation. Unless water is brought in, some 30 percent of 566,000 irrigated acres will be returned to desert, with severe reprecussions to business generally in the state.

Power is the urgent present need in California, but water can become a problem in the future, particularly to industrial and domestic users. Plants in the Los Angeles and San Diego areas already are asking. "Can we be sure of our water supply 25 years from now?"

See close power use-demand race

Electric power supply in the United States will continue tight throughout 1948 and 1949, the National Security Resources Board said last week.

The NSRB report is the result of a recently completed survey of power supply output for the four years 1948-51, released last week by Arthur M. Hill, chairman of the government agency. The surveys were made by two groups of power experts, under the direction of Edward Falck, chief of NSRB's utilities section.

"During 1948 and 1949, power generating capacity will not be sufficient to provide really adequate reserves," Mr. Hill said. "By 1950 the margin of capability appears adequate in most parts of the country, and the situation will be further improved in 1951." He added that the country should be "greatly reassured" by the vast expansion program now being undertaken by the electric utility systems, involving an increase in generating capacity of roughly 20,000,000 kw. by 1951. Total national capacity is expected to climb from a minimum of 54,044,000 kw. in 1948 to 69,669,000 kw. in 1951. However, peak loads are expected to rise from 52,123,000 kw. to 62,651,000 kw. by 1951.

Congress studies $738 million plan to supply more water to Arizona

Reclamation Bureau report on Arizona scheme is qualified by state's dispute with California over allocation of water

Recommendations of the Bureau of Reclamation for construction of the central Arizona project on the Parker Dam pumping route have been transmitted in a recent report to Congress. This culminates some years of study of three routes by means of which Colorado River water might be brought to central Arizona (*ENR* May 24, 1945, vol. p. 742).

Cost set at high figure

To cost $738,408,000 (July 1947 prices), the project would divert some 1,200,000 acre-ft. of water annually at the existing Parker Dam. This water would be taken to the central Arizona area by Granite Reef aqueduct, a 241-mile lined canal with 1,800-cfs. capacity that would involve four pump lifts totaling 985 ft. Power for pumping and for commercial sale would be provided by generating facilities at several dams, including Bridge Canyon Dam, a 637-ft. high concrete arch-gravity structure on the Colorado.

The report assumes water availability in accordance with the official Arizona interpretation of the various Colorado River agreements. In so doing it notes that California challenges the validity of Arizona claims (See p. 1) and assumes that Congress will give consideration to the divergent views of the two states before providing funds. A benefit-cost ratio of 1.46 to 1.00 is shown based upon certain modifications of the reclamation law as contained in two bills now before Congress.

Groundwater code needed

In addition to the matters of water rights and of revisions to the reclamation law, qualifications placed upon the recommendations include the enactment of a satisfactory groundwater code by the state of Arizona and establishment of an improvement-district type of local organization having tax powers.

The state approved a groundwater code two months ago (*ENR* April 8, vol. p. 524) but it has not been determined whether this code is acceptable to the Federal government.

Changes required in the reclamation law are the addition of non-reimbursable costs allocated to silt detention, recreation and general salinity control. Besides this, interest rate on power costs would be reduced from 3 to 2½ percent and repayment period would be 78 years (the assumed useful life of the project) instead of 50 years for power and irrigation features and 40 years for municipal water developments as at present.

Many other features

To coordinate distribution of water in the project area effectively and meet other reclamation needs, other features are proposed. Bluff Dam would provide river regulation, flood control and silt retention above Bridge Canyon Dam on the San Juan River. Coconino Dam would provide silt retention on the Little Colorado River.

Granite Reef aqueduct would carry Colorado River water to the existing Granite Reef diversion dam on the Salt River. McDowell Dam would be constructed on the Salt River below its junction with the Verde River for flood control, river regulation, power and storage of Colorado River water not needed for immediate irrigation demands. Enlargement of Horseshoe Dam on the Verde River would provide increased storage capacity and power production.

Salt River water would be diverted and transported by the Salt-Gila aqueduct for use in the Gila basin above the juncture of the Gila and Salt rivers. This would allow greater irrigation uses upstream and the municipal diversion at Charleston Dam for the city of Tucson. Buttes Dam, beside providing flood control, river regulation, silt retention and power, would help this Gila development.

The project, according to the report, is essentially a "rescue" project designed to eliminate the threat of the serious disruption of the area's economy. It is designed to serve almost 700,000 acres that have at one time or another been irrigated. At present, groundwater supplies are being seriously overdrawn, resulting in lowering of the watertable. During the period 1940-1944, an estimated 468,000 acre-ft. a year was pumped in excess of the safe annual yield of the underlying groundwater basins. Because of this, wells on which some irrigators are dependent have failed, taking some acreage out of production.

Much of the future business development of Arizona is dependent on steady and increasing water supply to the irrigated lands and to mushrooming desert cities and industries that need both water and power.

Average firm energy produced would be almost 4.5 billion kwh. per year, primarily at Bridge Canyon power plant. Of the 770,100-kw. installed capacity, 750,000 kw. is proposed at Bridge Canyon. Some 1.3 billion kwh. per year would be required for the various pumping plants.

Repayment is based on $4.75 per acre-ft. of water delivered to the farmer's head gate, 4.82 mills per kwh. for power, and 15c. per 1,000 gal. for municipal water.

These studies were carried out under the direction of E. A. Moritz, regional director, Region III, Bureau of Reclamation. R. V. Sprague, regional planning engineer, and V. E. Larson, assistant regional planning engineer, directed the work.

TABLE I--ESTIMATED COSTS

Bridge Canyon Dam	$191,939,000
Bridge Canyon Power Plant	73,419,000
Granite Reef Aqueduct	131,716,000
Havasu Pumping Plants	25,973,000
Bluff Dam	29,628,000
Coconino Dam	7,487,000
McDowell Dam, Canal and P.P.	20,684,000
Horseshoe Dam (Enl.) and P.P.	9,706,000
Salt-Gila Aqueduct	34,585,000
Buttes Dam and P.P.	30,196,000
Charleston Dam & Tuscon Aque.	15,671,000
Hooker Dam	15,484,000
Safford Valley Improvements	4,090,000
Irrigation Distrib. System	54,086,000
Salinity Control Drainage	9,973,000
Power Transmission System	83,771,000
TOTAL	$738,408,000

TABLE II --FEATURES OF PROJECT DAMS

Name	Type	Height (ft.)	Crest Length (ft.)	Reservoir Capacity (acre-ft.)	Power Plant Capacity (kw.)
Bridge Canyon	Concrete arch-gravity	673	1,950	3,720,000	750,000
Bluff	Concrete gravity	315	950	3,000,000	
Coconine	Concrete gravity	205	350	1,700,000	
McDowell	*	126	4,100	578,000	4,100
Horseshoe	Earth and Rockdrill	185	1,600	298,000	10,000
Buttes	Concrete gravity	217	970	400,000	6,000
Charleston	Concrete gravity	158	1,160	238,000	
Hooker	Concrete gravity	222	.....	98,000	

*Slab and buttress and earth embankment

HIGHLIGHTS OF MUNICIPAL DEVELOPMENTS

Summarizing current activities in city engineering and construction throughout the country.

New York authorizes first zoning survey in 30 years—Milwaukee implements smoke control ordinance—Traffic, parking problems face engineers—Other municipal news

New York City last week took the first step toward a general survey of its zoning ordinances since 1916 when the Board of Estimate appropriated a fund of $160,000 for a comprehensive study of regulations.

Board members said that in recent years the City Planning Commission, which administers the 32-year-old code, had granted about 200 modifications of the rules for specific cases without changing the substance of the regulations as a whole. Budget Director Thomas J. Patterson commented that the planning commission has for some years been pondering the idea of completely rewriting zoning regulations to make use of new techniques and new suggestions. He said the commissioners felt that before proceeding with any general rewriting of the ordinance, they should be in possession of basic data relative to present and anticipated land use, available areas—particularly in relation to parking near industrial and commercial centers—and new uses of deteriorated areas.

The commission employed the consulting firm of Harrison, Ballard & Allen to make initial studies looking toward the adoption of a comprehensive revision of the ordinances by late 1949.

Other planning moves during the week included the announcement that representatives of the Central Business District Council of the Urban Land Institute, Washington, D. C., are now scrutinizing metropolitan Indianapolis, Ind., with the aim of making recommendations for off-street parking, thoroughfares, city financing and other matters.

At Wilmington, Del., the first master plan for development of rural New Castle County is now being prepared for submission to the 1949 session of the Delaware legislature. The regional planning commission, at a special meeting at Wilmington, said that Harold N. Lewis, New York City consulting engineer, had been retained to work with the commission and with Fred S. Price, secretary-engineer of the commission, in developing the plan.

Speeding traffic

The problem of moving traffic through congested business areas has brought another series of solutions, ranging from construction of new bridges to free bus rides for shoppers.

Among the construction-solutions were:

The promise that a $900,000 underpass would be built beneath the tracks of the Union Pacific Railroad in downtown Grand Island, Neb.; the announcement of plans for a $7,000,000 bridge and approaches to cross the Maumee River between Toledo and East Toledo, Ohio, to eliminate a dangerous street bottleneck; agreements between the State of Maryland and officials of Baltimore for the financing of the first section of a proposed crosstown expressway and extension of Wilkens Avenue to carry Washington and New York bound traffic through the congested city; and announcement that a mile-long park will be established along Highway 30 between Upper and Lower Nemahbin Lakes, in Milwaukee, Wis., as part of the relocation of 8 miles of the Milwaukee-Madison highway in the Waukesha County lake region.

Other solutions centered around the establishment of off-street parking facilities and the use of parking meters:

Boston Mass., holds a title to the Boston Common that will permit construction of an underground garage for 4,400 cars. In a decision of the state's Supreme Judicial Court, Justice James J. Ronan declared the site free of any trusts and free of action on two equity suits brought by Beacon Hill and Back Bay residents.

SKYLINE ADDITION — Adding to the business district of Sacramento, Calif., will be this 6-story, air-conditioned, concrete and steel medical-dental building. The $750,000 structure was designed for the Professional Building Co., Sacramento, by Walter Wurdeman and Welton Becket, architects.

The court upheld the constitutionality of 1946 legislation that authorized the city to enter into contract with a private company for construction of the $5,000,000 project. Under the statute the underground space may be leased by the city at not less than 2 percent of the gross receipts and the term of the lease may not be less than 20 years or more than 40 years. The court said, in part: "The garage is an incident in a legislative plan designed to abate a public nuisance arising from serious traffic congestion."

The supreme judicial body came into the case when a lower court ruled that the Common was a public trust.

Mayor James M. Curley said that work on the garage would start at once.

Evanston, Ill., installed 1,100 new parking meters, to give Chicago residents a preview of them. Chicago plans to install meters throughout the city during the coming summer.

Merchants of Sacramento, Calif., tried a new approach to their parking and traffic problems by offering free bus rides to midday shoppers. Aimed at inducing shoppers to leave their cars at home, the merchants offered bus service to shoppers any time between 10 a.m. and 4 p.m. The housewife boarding a bus in her neighborhood receives a colored slip from the driver, and if her purchases at any store amount to $1 or more, she is given two bus tokens in return for her slip. Sacramento bus lines added more buses to their off peak schedule to speed up service, and in the first four days of the plan, 70 downtown stores paid out 10,000 tokens.

Sewers and water

Sewer and water supply programs continued to be advanced.

A $6,000,000 to $8,000,000 Boston sewage treatment plant, a link in the anti-pollution drive in eastern seaboard harbors, is now on the planning board of the Boston Public Works Department, city officials said. In Indiana, the state's Stream Pollution Control Board dropped a suit against the city of Warsaw over the pollution of Walnut Creek and the Tippecanoe River, after the city signed a contract authorizing the city engineer to complete preliminary plans for a disposal plant.

At Louisville, Ky., the Metropolitan Sewer Board approved an $8,000,000 bond issue to finance a long-range sewerage program that would include extension to neighboring St. Matthews. Construction of the plant and the extensions would eliminate dumping of sewage in Beargrass Creek.

Fort Wayne, Ind., abolished the office of city sewer superintendent, consolidating the duties of the office with those of the city engineering department.

Water supply developments include: The city council of Edwardsville, Ill., voted to purchase the Edwardsville waterworks plant from the Illinois Cities Water Co. for $566,000. At Defiance, Ohio, the city council considered installation of a $100,000 filtration plant following State Department of Health recommendations to correct a cloudy condition recently discovered in the city's water supply. Pittsburg, Kan. took bids for construction of a 1,000,000-gal. water storage reservoir.

Smoke control to start

A new smoke control ordinance, subject of much recent debate in Milwaukee, Wis., will become effective Oct. 1, the highway committee of the county board said last week.

The board announced that John E. Brown of Cincinnati, Ohio, will be the air pollution engineer, to take over his duties this month. Original plans were for the ordinance to become effective June 1, but the extension was agreed upon to permit Mr. Brown to study the local situation and draw rules and regulations with the assistance of a five-man advisory committee.

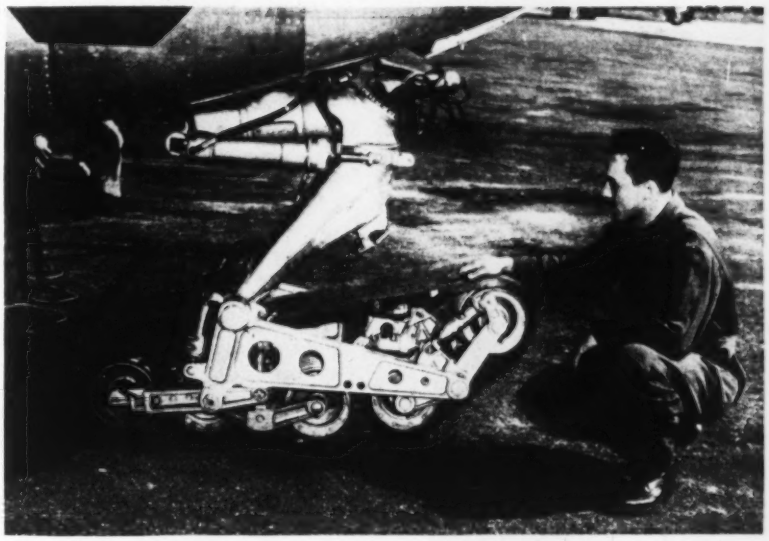
At Buffalo, N. Y., the city's 13-month-old smoke abatement ordinance is being enforced inadequately because of the lack of personnel, Public Works Commissioner Elwin G. Speyer said. The chief stumbling block is the city's inability to obtain a qualified combustion engineer to head the smoke control division, or to get the necessary smoke inspectors.

Uniform plumbing code

The Housing and Home Finance Agency of the federal government and the Department of Commerce announced that they have made arrangements to continue work on the proposed uniform plumbing code which has been under the auspices of the Department of Commerce.

The plan calls for completion of certain research and evaluation of test results in order that the code for housing, developed by a committee of the HHFA, may be expanded into a set of recommendations applicable to all types of plumbing installations, including commercial and industrial. The committee is composed of representatives of the plumbing industry, including labor and management, and government agencies. From the outset, an HHFA announcement said, it was seen that there was a vital need for a uniform plumbing code governing all types of installations and that there were practical difficulties to be encountered in promoting the adoption by municipalities of a code applicable to only one segment of the building industry. A more general standard is the indicated solution, officials said.

The plumbing code for housing, based on tests made by the National Bureau of Standards, was issued recently by the HHFA as Technical Paper No. 6.



REDUCING GEAR—A track-tread airplane landing gear that may have a profound effect on construction of airplane landing strips has been developed for the Air Forces by the Firestone Tire and Rubber Co. Here installed on a 54,000-lb. transport plane, the tread takes the place of tires, and like conventional landing gear is fully retractable. It is said to reduce the pressure on the runway from 60 to 20 lb. per square inch, and is seen as a step toward speeding wartime air action by making possible use of hastily-levelled areas.

Street work

Akron, Ohio prepared to proceed with work on some 12 miles of new paving that will see the resurfacing of sections of four main city thoroughfares, as many cities began to repair the damage of the last winter and make provision for widening and other work.

Toledo, Ohio, heard a recommendation from Arnold V. Finch, city engineer, that the city spend $1,321,000 for stabilizing the surface of Toledo's 90 miles of cinder-surfaced streets and 154 miles of unimproved alleys.

Atlanta, Ga., signed a contract with Robert & Company Associates, Inc., to prepare designs and specifications and supervise construction of a park-plaza over railroad tracks between Whitehall and Pryor Street viaducts.

No fraud found

There is no evidence of collusion or price fixing among bidders awarded Minneapolis, Minn., city sand and gravel contracts, according to the Hennepin County attorney's office.

Mayor Hubert H. Humphrey had asked the county attorney to investigate recent contract lettings (*ENR* Apr. 15, vol p. 540) after he charged that sand and gravel companies had violated the anti-trust statutes in recent city bid openings.

The investigation of sand and gravel contracts started after the Minneapolis *Tribune* in an article on Feb. 27 pointed out that several of the companies which bid against one another to obtain city orders apparently are linked by interlocking directorates or through common officers.

Collect garbage fee

The Youngstown, Ohio City Council recently enacted an ordinance authorizing a 50 cent per can fee for collection of commercial garbage.

The law establishes a charge of 50 cents for each 30 gal. can of garbage in excess of a weekly allowance of one can. The city engineer's office was authorized to fix average charges to be paid by commercial establishments.

1947 steel production 93 percent of capacity

Production of steel in the United States during 1947 proceeded at an average of 93 percent of rated capacity to mark an increase of 60 percent over 1939, members of the New Haven, Conn., chapter of the American Society for Metals were told recently.

R. E. Zimmerman, vice-president for research and technology of the United States Steel Corp., said that the 1947 production of steel was 84,800,000 tons of ingots, or 63,000,000 tons of finished rolled products, U. S. production being between 53 and 54 percent of the world total.

Defending the attitude of the steel industry and the prices of steel, Dr. Zimmerman said that the industry had decided on a sound and orderly course of expansion to maintain steel prices at the lowest possible level, and he added:

"More than two years ago the various units of the steel industry were laying plans for postwar activities. Progress was much lower than had been anticipated because of the shortage of skilled workmen, labor and materials. However, by Jan. 1, 1948, the total ingot capacity slightly exceeded 94,200,000 tons, and with the completion of plans now in progress, an additional million tons should be added in each of the years 1948 and 1949.

"Ingots cannot be produced by providing open hearth, Bessemer and electric furnace facilities. There must be something to charge into the furnaces; there must be additional ore, boats and cars to transport it, and coke and coal.

"Construction costs have been mounting rapidly. To provide balanced new capacity in a fully integrated steel plant now requires the expenditure of approximately $300 per yearly ton of salable product. In other words, for a new one million-ton installation, an investment of around $300,000,000 is involved. For this reason, the depreciation charge against the product of the new equipment, at the present 4 percent rate, becomes $12 per ton.

"Either the addition of very high-cost facilities must be kept within reasonable economic proportions, or higher prices must be obtained. Higher prices, in our present economic situation, are not a preferred or desirable method of procedure if they can be avoided."

Dr. Zimmerman concluded by pointing out that from 1940 to 1947, the wholesale price of all commodities in the aggregate rose 108 percent, according to the U. S. Bureau of Labor Statistics. The average price of steel, based on commercial records, increased by about 46 percent in the period, the speaker added.

ALSO RECORDED . . . .

What-can-you-expect note: The Kentucky Court of Appeals has awarded $1,500 damages to a woman who fell into a water-line construction ditch in the city of Hazard.

It doesn't seem safe to leave anything about, these days. Two years ago a five-ton, 30-ft. iron highway bridge collapsed into Cahokia Creek, near Edwardsville, Ill. and was hauled out to the bank for later restoration. County workers went out to re-set the structure recently, and discovered the entire span was gone.

Spotty stream-flow records as a basis for water-control projects plague Egypt, too. An Egyptian engineer, in Washington for talks with the Bureau of Reclamation, complained that records vary and some have considerable gaps. "On one stream," he lamented, "our records go back only 600 years."

It may be traceable to a general revolt against being told what to do—but the Washington State Highway Department will have to spend $100,000 this year to replace some 15,000 highway signs destroyed or damaged during 1947.

If union carpenters in Decatur, Ill., accept a 15-cent pay raise, it will cost them $50. In an unusual action, the union local, which announced it would go on strike early in June for a 25 cent hourly increase, threatened to fine members if they accepted a preliminary 15-cent offer made by contractors.

The simple expedient of effective use of local police powers won a victory over the sovereign state of New Jersey for three small suburban towns. When the state highway department closed a three-mile stretch of State Route 17 through suburban Hasbrouck Heights, Carlstadt and Wood-Ridge and started shunting heavy commercial traffic through quiet residential areas, town police blockaded the detour routes, refused to permit "foreign" vehicles on the streets. The state beat a hasty retreat after a day of snarled traffic, and promised to find other detours or keep part of Route 17 open during repair work.

Ill-Miss. canal urged by Corps of Engineers

Construction of a new Illinois and Mississippi Canal between Bureau, Ill. on the Illinois River and Hampton, Ill., on the Mississippi River has been recommended by the Corps of Engineers District Office in St. Louis, Mo.

The 64-mile canal would cost an estimated $99,759,000. It would reach the Mississippi about 15 miles north of Rock Island, and effect a saving of some 400 miles in water travel for shipments between points along the Upper Mississippi and Chicago via the Illinois waterway. The present Illinois and Mississippi canal is almost useless because of its narrow width and shallowness.

Army Engineers estimated that the new canal would effect an annual saving of about $5,500,000 for shippers.

Oregon contracts for state office building

Contract for construction of a state office building at Salem, Ore., has been awarded by the Oregon State Board of Control to the Sound Construction & Engineering Co., Seattle, on a low base bid of $1,592,592.

The last Oregon legislature appropriated $2,000,000 for the building. Original estimated cost was $1,900,000. The five-story building will be of concrete construction, faced with marble. It will house several of the state's largest agencies, including the State Unemployment Compensation Commission, Employment Service and Industrial Accident Commission.

The Sound company is already erecting two buildings at the state hospital for the mentally ill.

Vapor condensation control discussed

Plans for the publication of a booklet on vapor condensation control in housing were discussed at a two-day conference in Washington last week under the sponsorship of the Housing and Home Finance Agency. More than 50 technicians and research engineers participated in the discussions on specific recommendations for the use in housing of insulation and related items, such as vapor barriers and ventilation.

The proposed booklet will present the results of years of research in the field of condensation control.

It is generally recognized that many present-day practices in construction tend to aggravate the problem of vapor condensation on or within the walls, ceiling and roof of houses. This condensation may prove to be extremely detrimental to the structure and costly to the owner.

$2 billion school building program ready for work, FWA survey shows

Federal Works Agency estimates nation-wide need at $5 billion, however—No decrease in demand seen

Plans are in process or completed for some $2,000,000,000 of new primary and secondary schools in the United States. This figure compares with a gross need conservatively estimated at $5,000,000,000 for construction of tax-supported schools in the two classifications.

Commissioner George H. Field of the Bureau of Community facilities cited the following figures recently in a report to his chief, Maj. Gen. Philip B. Fleming, Federal Works Administrator. The total for schools includes $593,000,000 of structures for which aid was received in the form of loans from FWA to finance planning costs.

Loans for that purpose had been made to 2,153 school districts by the Bureau of Community Facilities before the FWA advance planning program came to an end with the expiration of the War Mobilization and Reconversion Act on June 30, 1947. In all, these planning loans came to a total of $23,000,000. By March of this year, the districts had completed plans for 932 of the schools, and some of the buildings were under construction.

When the advace planning program came to a close last year, FWA had 893 additional applications under review for planning assistance to schools estimated then at $298,042,000. A continuing survey of educational programs in school districts receiving no federal planning assistance has produced a broadly inclusive, though incomplete, listing of other school projects—1,728 for which plans have been completed, estimated to cost $276,217,000 and 2,486 in the design stage, valued at $891,253,000.

If the 893 proposals under FWA review last June have moved ahead without federal assistance into the design stage, it can be estimated that plans are in progress for some 7,260 school projects to cost $2,058,512,000. Financing of the building programs will be a problem in many school districts. Relatively few districts are in a position to swing into programs that will meet all needs of the flood tide of young children about to break upon them.

Pointing to three factors the 29,000,000 children enrolled in elementary and secondary schools in 1947, the 1,500,000 five-year-olds not yet attending school, and the high birth rates of recent years, commissioner field forecast a sharp increase in enrollment during the coming decade. Beyond the secondary schools, he noted the increased attendance in colleges and universities of 1,000,000 above the 1940 figure, to a total of 2,300,000 with 250,000 having been turned away for lack of space.

No decrease in the needs is foreseeable at any level of education, he said. Quoting a country-wide survey by the U. S. Office of Education that showed need of an $11,000,000,000 program for all institutions of learning, both public and private, he called the estimate probably conservative, because of the lack of complete state-by-state surveys.

Supported by surveys

Studies by the McGraw-Hill department of economics substantiate the office of education estimate. The economists declare that the added pressure of the increased wartime birthrate makes it necessary for the United States to invest $11,000,000,000 in new schools and equipment in the next 10 years.

Planning of new schools takes time, as the FWA report makes clear. On the basis of loans repaid, at the time when new schools go under construction, as required by law, it is shown that the average elapsed time from initiation of a project to the taking of bids is 18.3 months.

Congress now has before it bills that would authorize renewal of the FWA advance planning program. The bills provide appropriations of $50,000,000 a year for five years. Schools and other educational facilities made up the second largest classification for which applications had to be deferred at the end of the old program. They were exceeded only by sewer, water and sanitation facilities, estimated to cost $302,410,000.

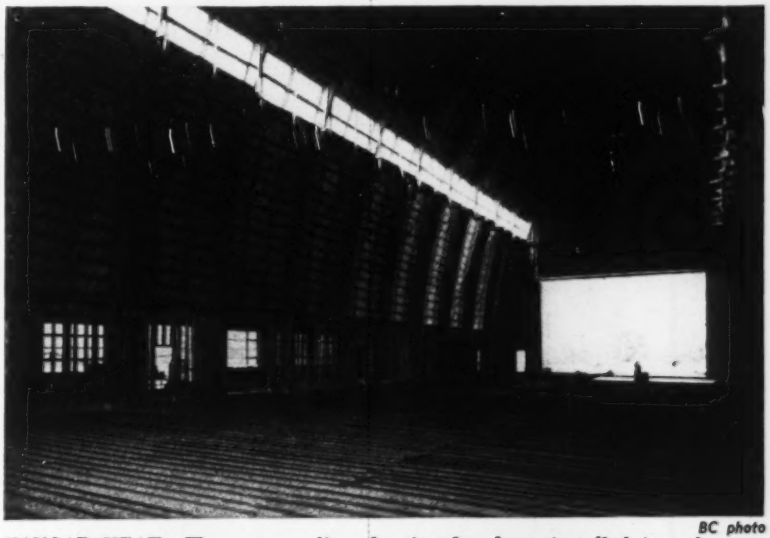
Trial reservoir to test Ohio floodwall sections

Work will begin Aug. 1 on an experimental reservoir with 20 different types of walls and foundations to test floodwall sections on a 10-acre site on the Ohio River, one mile above Coney Island at Cincinnati.

Each of the four walls, 35 ft. high by 135-ft. long, will consist of five 20-ft. sections of different types of flood walls.

The finished project will resemble the Winton Road reservoir of the Cincinnati waterworks. Scores of pressure gauges will be imbedded in the foundations and walls of each section for charting the effects of pressure at different levels. To carry out the experiment the water in the reservoir will be maintained at a normal level of 25 to 30 ft.

According to Paul B. Mason, of the Corps of Engineers, the site of the experimental reservoir was deliberately chosen in a section of porous floodplain terrain, where construction conditions would be at their worst.

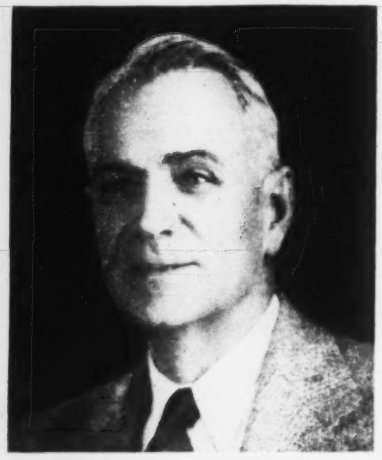


BC photo

HANGAR HEAT—Floor-type radiant heating has been installed in a hangar-type structure recently completed by Army Engineers for use as a radar test laboratory at Wright Field, Ohio. The building contains 15,000 sq. ft. of floor space, has a ceiling 75 ft. high. Wrought-iron pipes ranging in size from 1¼ in. to 6 in. conduct heated water through the concrete floor.

MEN AND JOBS

Arnold V. Finch, former engineer for the Ohio Highway Department, has been appointed Toledo commissioner of engineering, succeeding **Clayton L. Piper,** who has been named to the newly-created city post of commissioner of aviation. Mr. Piper, a veteran of 21 years of city service, reorganized the division of harbor and bridges several years ago and was named to the commissionership in 1940. He served three years with the Army Air Forces as a major. He initiated the drive for a modern airport development in Toledo upon his return to city service in 1944. Mr. Finch previously was employed as consultant on city street problems, and served with the state and Lucas County at various times, and was engaged by the federal government during the recent war.



Dan Miller recently retired as managing engineer of the Pacific Coast division of the Asphalt Institute after 16 years. He started in 1912 with a field party in the surface division of the District of Columbia, later entering the construction field as superintendent of the Warner-Quinlan Asphalt Co. After service in World War I as a captain, he became district engineer and subsequently state maintenance engineer of the Wyoming highway department. He organized the west coast division in 1931.

Robert O'Brien and **Alfred Russell,** have been named assistant county road engineers for Jefferson County, Ky. O'Brien has been a draftsman for the Louisville engineering department; Russell has headed a survey crew in the county road department.

Walter C. Otto, Sac County, Iowa, county engineer, has resigned and will remain in Sac City to operate an engineering firm of his own. **Don E. McLean** of Wayne, Mich., has become the new county engineer.

C. M. Walker has been appointed chief engineer of Eastern Rockies Forest Conservation Board, having resigned as supervising engineer of the Engineering and Construction Service for Western Canada to accept the office. Graduated from the University of Toronto in 1911, he was engaged in survey work in western Canada until 1927 when he joined the Service for Western Canada in which he became supervising engineer in 1936 with headquarters in Banff, Alta.

Robert S. Stein is a soils engineer in the civil engineering department of the Tela Railroad Co., La Lima, Honduras. He is working on a project to flood lowlands to recover the silt burden of rivers on land which will later be used for banana farms. He is an honor graduate in civil engineering from Purdue and has a master's degree in sanitary engineering from Harvard. He spent two years in the Army in the Engineers Combat Battalion of the 88th Division, occupying northern Italy.

George Stevens, (left) with the Washington State Highway Department since 1934, has replaced Ralph W. Finke as state bridge engineer. Cecil K. Glaze, (center) formerly administrative director, was appointed engineer in charge of planning. Herbert C. Higgins, (right) formerly assistant office engineer is now traffic engineer.

Lt. Col. Noel H. Ellis, executive officer of the Garrison, N. D., engineer district since July 1946, has been assigned to the U. S. military ground mission at Caracas, Venezuela.

Frederick T. Paul, city engineer of Minneapolis, Minn., is to retire soon after 40 years of service. He joined the city engineer's department upon graduation from the University of Minnesota in 1909. He became a bridge builder and planner of city projects.

Emmett H. Hensing, pavement engineer for the last two years with Buell and Winter-Engineers, Sioux City, Ia., has resigned to accept a civil service appointment with the Corps of Engineers at Omaha, Neb. as engineer (materials) in connection with the Missouri Valley development. Previously Mr. Hensing had been with the T.V.A. for three years, and prior to that with the Iowa Highway Commission for 13 years.

The Virginia highway department has announced these promotions and transfers:

Burton Marye, Jr., traffic and planning engineer, will take the new position of assistant chief engineer of the department, Kenneth G. McWane, Lynchburg district engineer, becomes traffic and planning engineer.

S. V. Munsey, resident engineer at South Hill, will relieve Mr. McWane as engineer in charge of the Lynchburg highway construction district.

L. O. Bolton, assistant resident engineer at Christiansburg, will go to South Hill as resident engineer.

Anthony G. Boska, Glastonbury, Conn., senior engineer in the Connecticut Highway Department, has been named head of the department's bureau of economic record. **David S. Johnson,** Branford, also a senior engineer, has been appointed head of the bureau of economic studies.

Percy M. Ferguson, superintendent of the maintenance and repair depot, Memphis, Tenn., district, Corps of Engineers, has retired after 46 years of government service.

Eugene S. Funk, for the last several years superintendent of the New London, Ohio, water works and sewage disposal plant, has resigned to form the Funk Construction Co.

Joseph Latimore has been appointed city engineer of Coeur d'Alene, Idaho. He formerly served as sanitary engineer for the state. A graduate of the University of Idaho and holder of a master's degree from the University of Michigan, he served as captain with the Army's sanitary engineers nearly four years.

Robert E. Bagby, veteran Kentucky Department of Highways engineer, has been named director of the department's division of planning, succeeding Thomas R. Lannon. A graduate of the U. S. Military Academy, West Point, he joined the department in 1928 and served continuously until 1942 when he entered the Army Air Corps as a captain. He was discharged in 1946 as a lieutenant colonel and returned to the department to serve as third district engineer at Louisville until March of this year.

Harry F. Bressler, of Williamsport, Pa., has been named city manager of Milford, Del. An engineering graduate of Pennsylvania State College, he formerly served as an engineer with the War Department and Federal Works Agency. He also was in the engineering department of the Pennsylvania Railroad. He was selected from a field of 28 applicants.

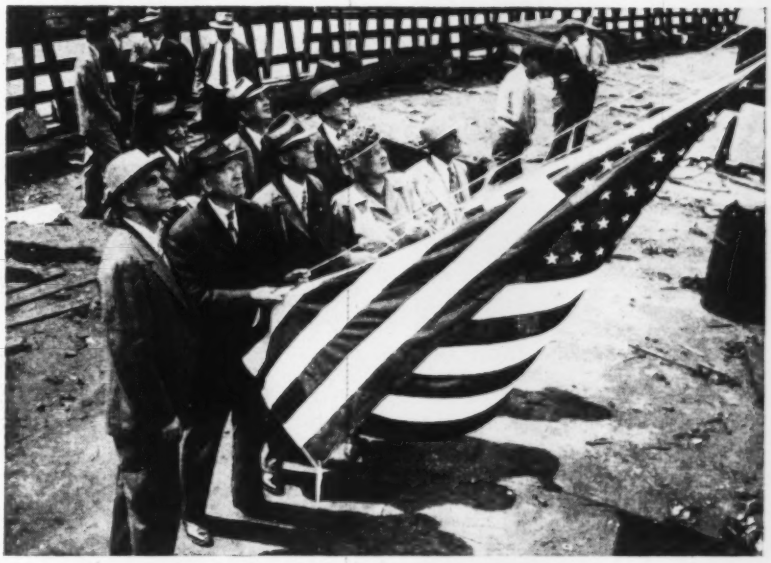
Herbert R. Pirkner, recently chief design engineer on highway tunnels in Texas and at Mobile, Ala., has been appointed to the staff of the Division of San Francisco Bay Toll Crossings.

Frank G. White has retired as chief engineer for the California Board of State Harbor Commissioners at San Francisco. He served the commission for 37 years, starting as assistant engineer in 1911. During that time he acted as consulting engineer on port projects in Vancouver, B. C., Portland, Ore., and Santa Barbara, Long Beach and San Diego, Calif.

Edward T. Williams, office engineer for the Port of Oakland, Calif., since June, 1927, has retired. He was an authority on titles and surveys.

C. Glenn Smith, who resigned recently as King County Engineer at Seattle, Wash., has returned to the General Engineering Co. of Seattle, with which he was associated before becoming county engineer at Seattle a year ago.

Rodney Ryker, formerly supervisor of hydraulics for the Washington State Department of Conservation and Development, has been appointed district engineer of The Asphalt Institute for Oregon and Washington, with offices at Seattle. He began his engineering career with the Washington State Highway Department in 1924 and served from 1936 to 1944 as a county engineer, first for Kittitas County at Ellensburg and later for Okanogan County at Okanogan.



At the recent flag raising ceremonies marking the setting in place of the last girder of the new State Street bridge in Chicago are seen, left to right, in the front row Stephen J. Michuda, engineer of bridges and viaducts; W. W. De Berard, city engineer; J. W. Belanger, representative of the State Street Council; Mrs. De Berard; and Wm. H. Lotts, president of Overland Construction Co. Standing directly behind are Leo Hiller, representative of the North Central Association; W. E. Lafgrew, assistant bridge engineer; and Carl A. Gaensslen, assistant engineer. A complete article on the construction features of this bridge will appear in a subsequent issue.

Col. William A. McWilliams, of Dover, chief engineer of the Delaware State Highway Department and an officer in the Coast Artillery Reserve, has been appointed a member of the National Military Highway Advisory Committee by Maj.-Gen. E. A. Leavey, Army Chief of transportation in Washington, D. C. The committee is composed of eight of the outstanding highway and traffic experts in the United States.

***Seen at the recognition ceremony which** took place at Kansas State College, Manhattan, Kan., recently, is Prof. L. E. Conrad (left), who has been retired after completing 40 years of service in the civil engineering department. L. W. Servis is presenting him with a scroll given by his former students.*

***Anglin Norcross, Ontario Ltd., Toronto,** are contractors for the new lens plant of the American Optical Co. at Belleville, Ont., costing nearly $1,000,000. Above are George Beale (left) superintendent, and Robert J. Coutlee, engineer for the contractor. Mr. Beale has followed construction work for more than 40 years.*

ENGINEERING SCHOOL NEWS

International students day at RPI—University of Hawaii has public works training school—Faculty changes at Florida

More than 100 students of Rensselaer Polytechnic Institute and Russell Sage College, Troy, N. Y., representing 35 foreign countries, Puerto Rico and the Canal Zone, recently attended an international students day celebration sponsored by the firm of W. & L. E. Gurley, century-old manufacturer of engineering and scientific instruments. Present also were diplomatic representatives of 16 European, Asiatic, and South American countries. Principal speaker at a campus luncheon was Waldo G. Bowman, editor of the *Engineering News-Record*, who spoke against restraints to freedom which require handwork where machines will do the job better. Such restraints, Mr. Bowman said, are at the root of most of the low living standards of the world today.

"Fortunately," Mr. Bowman said, "In the United States, our freedoms exceed our artificial restraints so that we have been able to install about 7 hp. of mechanical power for each person in the country, whereas 50 years ago there was only two hp., a figure that is not yet exceeded in most of the countries of the world. Here is a result of restraint that we as engineers should take as a challenge. Unless we can be freed from such restraint, the job of raising the living standards is going to be hard indeed."

S. V. Abrera, consul of the Philippines, told how American engineering instruments had done much in the reconquest of the Philippines by American forces. Abbas Ammar, cultural attache of the Egyptian embassy and assistant professor of the Faculty of Medicine, Fuad University, Cairo, encouraged the foreign students toward an attitude of optimism in world affairs which he deemed necessary for successful economic recovery and the maintenance of world peace.

The foreign students and representatives toured the Gurley plant where they saw engineering instruments being manufactured. On display were historical and modern models of engineering and scientific instruments covering the fields of geodesy, surveying, hydrology, meteorology, paper and textile testing, and standard weights and measures.

The New York State Education Department has registered curricula leading to the BS degree at Texas Technological College, Lubbock, Tex., in mechanical, electrical and civil engineering. This enables any Texas Tech graduate of these curricula to apply for registration as a professional engineer in New York State on a basis equal to that of graduates of other recognized engineering schools.

The University of Hawaii is helping in the plans for the "In service training school" for employees of the Honolulu Public Works Department. It has been conducted experimentally for one semester. In the first course 88 employees were trained and a number have since won civil service promotions in competitive examinations. Surveying, college algebra and arithmetic were taught by professional engineers employed by the city. Students studied from 7:30 to 8:30 a.m., three days a week for four months, giving half an hour of their own time and getting paid for the other half hour.

For the second semester, English will be added to the curriculum, paid teachers will be employed, and college and high school credit will be given. Enrollment will be held to 100 because of limited classroom space, although more students than that have applied. City Engineer Karl A. Sinclair is in over-all charge of the program with George Wallace, engineer of the division of sewers, in direct charge.

FRANK W. EDWARDS, for the last two years professor of civil engineering, Carnegie Institute of Technology, has been appointed director, department of civil engineering, Illinois Institute of Technology, Chicago, effective Sept. 1. He succeeds Prof. P. C. Huntly, retiring after 34 years. An alumnus of the University of Iowa, Professor Edwards received his B. S. in C. E. degree in 1928, an M. S. in hydraulics in 1930, and a C. E. in 1944. From 1939 until the war he served as chief of hydraulic design and research, Third Locks project, The Panama Canal. During the war he was chief, Military Subdivision, Wilmington, N. C., district, Corps of Engineers, on Army cantonments and airfields. During 1945-46 he served as chief, Design Branch, Omaha district, Corps of Engineers.

Executors of the late Sam J. Gorman have established a scholarship in engineering in the University of Alberta for an award of $200 every year to an outstanding student.

John F. P. Farrar, president of the Chicago Metal Hose Corp., has been appointed chairman, and Albert F. Hunt, a director and vice-president of Swift & Co., has been appointed co-chairman of the civil engineering and mechanics division of the $15,000,000 development program of Illinois Institute of Technology.

The 1948 goal for the program is $3,000,000. The Illinois Tech building and modernization program (ENR, Jan. 1, vol. p. 19) is already under way and five new Mies van der Rohe-designed academic and research buildings have been completed and now are in full use. Fifty-five additional academic, research, and housing structures yet remain to be built in the long-range program.

Mr. Farrar and Mr. Hunt both are trustees of the institute. Their division primarily will be devoted to providing funds for the construction of a new $700,000 civil engineering and mechanics building, for educational laboratory training, long-range fundamental research, and applied industrial research.

Recent additions to the faculty of the civil engineering department of the University of Florida are: Radnor J. Paquette, with the Michigan State Highway Department since 1935, has been appointed assistant professor of civil engineering and is in charge of a training program for personnel of the state road department; Professor Paquette was engineer for the Detroit Metropolitan District. Thomas L. Bransford, assistant professor of civil engineering, will direct courses in surveying and assist in the highway courses; Professor Bransford has been with the Tennessee Department of Highways since 1926. Sterling L. Bugg has joined the research staff of the department; he obtained his master's degree at Purdue this year.

ROUGH GOING—Some of West Virginia's highway construction problems are summarized in an airview of a 9-mile section of State Route 16, between Welch and Pineville. Vecellio and Grogan, of Beckley, W. Va., recently submitted a low bid of $847,400 on a contract for grading, drainage and surfacing of this section of the road.

Fishermen, transit groups oppose new Columbia dam

Proposed construction of a $270,000,000 power dam across the Columbia River at Priest Rapids in eastern Washington drew objections from fishery and transportation interests at a public hearing conducted in Wenatchee, Wash., by the Seattle district of the Corps of Engineers.

The Washington State Department of Fisheries complained that the dam would cause a loss of 10 to 15 per cent of the present total Columbia River fish catch, or an annual loss of $2,500,000. Donald McKaren, representing the Oregon Fish Commission, pointed out the difficulties of providing for fish runs over the proposed high structure. Mitchell Hanavan, representing the U. S. Fish and Wildlife Service, declared that the dam would have an adverse effect on fish life and objected that there is no assurance that adequate provision can be made to prevent depletion of fish and wild life in the area.

W. P. Stapleton, representing the Northern Pacific Railway, objected to including navigation locks in the dam, declaring there is no economic justification for them since the area already is more than adequately served by rail and highway transportation.

Statements in support of the dam came from the Columbia Basin Commission, chambers of commerce and public and private power interests.

Plans call for a multi-purpose dam 12,000 ft. long, and 200 ft. high from foundations to top. The powerhouse would have 23 units of 54,000 kw. each.

SeaBee veterans form a national association

SeaBee veterans of 73 cities were represented at the SeaBee Veterans Association of America constitutional convention in Chicago recently. One hundred sixty-one construction men from local chapters attended. Temporary national officers were selected and a corporate charter, to be submitted to Congress for approval, was adopted.

The officers, who will serve until the national SeaBee reunion convention in Chicago next Oct. 7-10, include Howard P. Potter, chairman; Lee W. Jones, Lincoln, Neb., secretary; Leo F. Crowley, Detroit, Mich., treasurer, and Harry S. Conklin, Miami, Fla., Carl Pickett, Brooklyn, N. Y., R. Fred Whitlock, Denver, Colo., W. J. Slavin, Toledo, Ohio, Nelson Francisco, Jeffersonville, Ind., all vice-chairmen.

Capt. Potter is a district director of U. S. Navy CEC Reserve.

Seek ending of union-shop elections

The Taft-Hartley requirement for union shop elections in the construction industry was criticized by representatives of both the Associated General Contractors and the AFL building and construction trades department at hearings being held by the Senate-House Joint Committee on Labor-Management Relations.

This "watch-dog" committee, headed by Sen. Joseph H. Ball, has before it several bills to drop the rule that employees must first approve in a National Labor Relations Board poll before a union may negotiate a contract which makes union membership a condition of employment. Among reasons for the proposed change are the strain it is imposing on NLRB's election machinery and the difficulty of conducting elections in the fluid construction industry. Besides, unions are getting approval in 98 percent of the elections.

Construction industry views were presented by James D. Marshall, AGC assistant managing director; Ralph A. MacMullan, secretary-treasurer of AGC's Detroit chapter, and Richard J. Gray, head of the AFL building trades unions.

Marshall and MacMullen made no specific recommendations, confining their remarks largely to the problems the elections raise in the industry. Marshall pointed out that, where a closed shop has prevailed in the past, a union-shop "authority" poll "is only a most complicated, time-consuming and expensive process of demonstrating a foregone conclusion."

MacMullen gave the committee a picture of the situation in Detroit, where the second construction industry "pilot" election may be held. In Detroit, he said, there are 37 local building trades unions, not counting district councils. The geographical jurisdiction of the unions ranges from a county to an entire state. Currently, there are 3,000 building jobs going on.

MacMullen said Detroit contractors are in favor of union security provisions and have urged that elections be held, but he thought it unnecessary to waste time, money and effort to "establish a record of what already exists."

Gray charged that the law made it impossible to maintain standards of skill.

In an administrative ruling, General Counsel Robert N. Denham of NLRB has authorized the signing of union-shop contracts without the elections if they are not enforced until the election requirements have been met.

California construction to total $75 million

California will get about $75,000,000 worth of construction, exclusive of highways, under way during the fiscal year beginning next July 1.

The work to be done will make only a fair-sized dent in the state's construction backlog. The construction reserve totaled about $350,000,000 a year ago. The public works board had it whittled down to about $300,000,000 early this year, but the legislature appropriated another $40,000,000 at the budget session in March.

The work expected to be started in the new fiscal year is divided up this way:

Prisons, $8,000,000; mental hospitals, $16,000,000; office buildings, $10,000,000; University of California, $20,000,000; other state colleges, $10,000,000; and armories, $3,000,000.

Major projects at the University of California will include a $2,000,000 engineering building, classroom structures costing $3,850,000 and a physics building costing $1,200,000—all on the Berkeley campus; and a $5,850,000 science building and other structures on the campus at Los Angeles.

OBITUARY

Conrad J. Langenfelder, 71, well-known contractor of Baltimore, Md., died there May 25. He specialized in excavating and his firm, C. J. Langenfelder & Son, did much of the work on Andrews Field at Camp Spring, Md., Phillips Field at Aberdeen Proving Ground, the airport at Edgewood Arsenal, Baltimore's new Friendship International Airport in Anne Arundel County, Maryland and some of the excavation work on the Pennsylvania Turnpike.

Ray Keltner, 69, chief engineer for a federal survey of the Boyer River, died at Denison, Iowa, May 20.

Maj. Nathan R. Chaney, 43, former post engineer at Fort Benjamin Harrison, Indianapolis, Ind., died May 11 in Fort Wayne, Ind.

Edward W. Crellin, 85, retired steel executive and civil engineer, died May 16 at Pasadena, Calif. He was a civil engineer graduate of the State University of Iowa, 1890. He founded the Des Moines Bridge & Iron Works and was a former president of the Amalgamated Pittsburgh-Des Moines Steel Co.

A. Pierce Paterson died in Rothesay, N. B., May 12. A graduate in science of McGill University, Montreal, at one time he had been an engineer with the Federal Light & Traction Co., at Albuquerque, N. M.

Laurence Vincent Benet, civil engineer who invented the Hotchkiss machine gun, died May 21 in Washington, D. C. After being graduated from the Emerson Institute in Washington, D. C. and from Yale in 1884, Benet joined the Hotchkiss Company.

Labor Notes

A raise of 15 cents an hour has settled the 10-day strike of 150 union painters at *Niagara Falls, N. Y.* . . . AFL carpenters district council and the three locals of operating engineers unanimously voted to reject the 10 percent wage increase offered by the General Contracting Employers Association of *Buffalo, N. Y.* and a strike was continued . . . A 17½-cents-an-hour increase has been granted AFL bricklayers unions by contractors in *Minneapolis* and *St. Paul, Minn.* . . . At latest reports, union craftsmen had begun to return to construction jobs in the *Elmira, N. Y.*, area, walking through picket lines established by striking electricians. Meanwhile, no progress was reported toward settlement of the 34-day-old electricians' strike . . . The city commission of *Dayton, Ohio,* has granted general wage increases to all of its employes, raising operating costs by $294,082 through the rest of this year . . . Building and Construction Trades Council and Inter-mountain branch, Associated General Contractors, at *Salt Lake City, Utah,* reached an agreement on wage increases, averting a strike which threatened to halt practically all major construction work in Utah. Carpenters and cement finishers will receive an hourly increase of 20 cents and members of the operating engineers, laborers and teamsters a 15-cent increase . . . Pay boosts for building trades workers have just become effective at *Casper, Wyo.* Carpenters will get $2 an hour; plumbers and pipefitters $2.25; plasterers and cement finishers, $2.20; iron workers $2.25; and common laborers, $1.45.

Big increase recorded in Illinois airports

The number of airports certified to handle air traffic in Illinois has nearly doubled since 1945, the state aeronautics director reported.

In the same period, Director Robert Dewey said the number of restricted landing areas and private fields approved, after meeting specific requirements, increased from 12 to 195. Dewey said there now are 170 airports in Illinois certified to handle air traffic compared to 88 in 1945.

MAJOR MEETINGS

American Society for Engineering Education, 56th annual meeting, University of Texas, Austin, Tex., June 14-18.

National Association of County Officials, Annual conference, Hotel George Washington, Jacksonville, Fla., June 21-23.

American Society for Testing Materials, annual meeting, Hotel Book-Cadillac, Detroit, Mich., June 21-25.

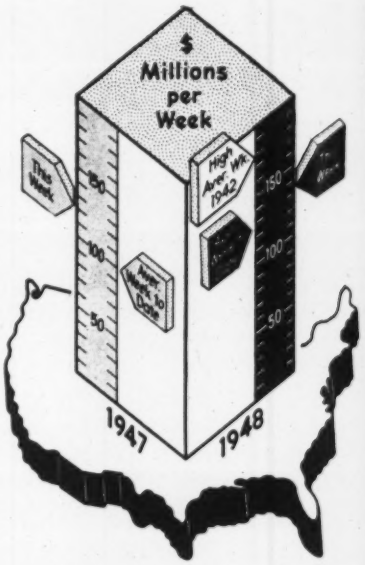
American Road Builders Show, Soldier Field, Chicago, Ill., July 16-24.

American Society of Civil Engineers, Annual convention, Hotel Olympic, Seattle, Wash., July 21-23.

Regional Surveying Teachers Conference, Green Engineering Camp, Ringwood, N. J., Aug. 26-28.

National Council of State Boards of Engineering Examiners, annual meeting, Hotel Utah, Salt Lake City, Utah, Aug. 27-28.

CONSTRUCTION ACTIVITY



As Reported this week to . . .
Engineering News-Record

CONTRACT VOLUME

Continental U. S. Only
(Thousands of Dollars)

	Week of June 3 1948	Cumulative 1948 (23 wks.)	Cumulative 1947 (23 wks.)
Federal	$6,488	$475,404	$258,927
State & Mun.	37,338	1,011,919	679,344
Total Public	43,826	1,487,323	938,271
Total Private	91,229	1,384,769	1,339,496
U. S. Total	**$135,055**	**$2,872,092**	**$2,277,767**

WHERE CONSTRUCTION ACTIVITY ORIGINATED THIS WEEK

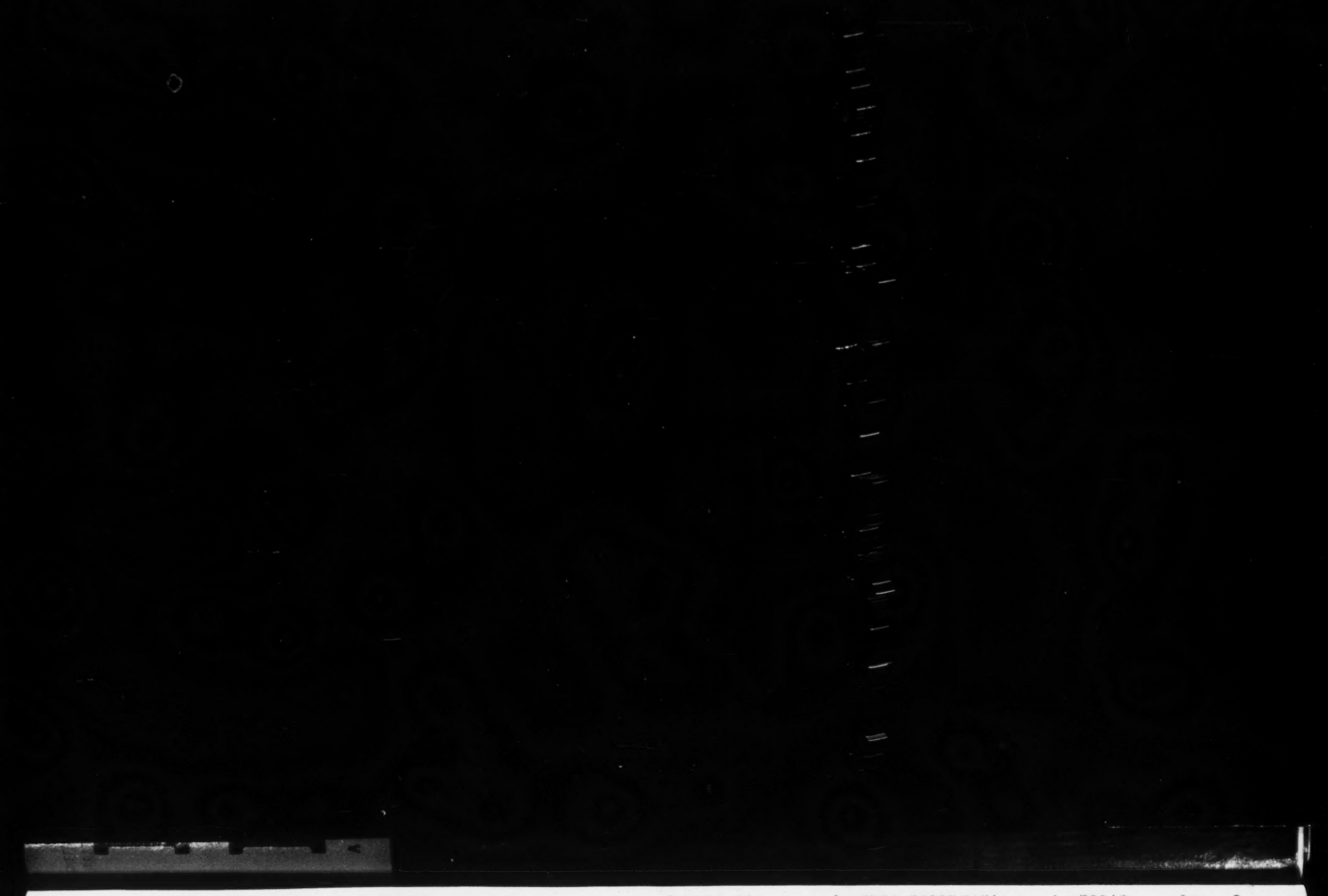
Dollar Volume (Thousands)

Type of Work	This Week	Cumulative 1948 (23 wks.)	Cumulative 1947 (23 wks.)
Waterworks ...	$1,278	$93,489	$50,988
Sewerage	4,316	91,398	47,687
Bridges	3,388	116,532	69,843
Highways	19,665	405,002	318,675
Earthwork, Waterways	1,815	246,949	128,938
Buildings, Public	10,553	442,954	216,804
Industrial ...	55,813	456,644	346,810
Commercial .	24,751	824,106	797,390
Unclassified ...	13,476	195,038	300,632

NOTE: Minimum size projects included are: Waterworks and waterway projects, $22,500; other public works, $50,000; industrial buildings, $68,000; other buildings, $250,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1948 (23 wks.)	Cumulative 1947 (23 wks.)
NON-FEDERAL ...	$1,645,184	$712,638
Corporate Securities	914,978	244,729
State and Municipal	730,206	467,909
Total Capital	**$1,645,184**	**$712,638**

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost	May '48	447.86	215.29
Building Cost	May '48	333.93	180.51
Volume		258	113